Navigating Planetary Missions: Enhancing SOC Preparedness in Long Cruise Phases through Product Assurance

This abstract delves into the role of Product Assurance (PA) throughout the development and operational phases of space missions, with a specific focus on planetary missions. These missions present unique challenges and opportunities during their long cruise phases, which involve extended interplanetary travel durations.

We highlight two representative cases, namely the BepiColombo Science Planning System and Downlink System to illustrate the evolution of the SOC (Science Operations Center) elements during long cruise phases. These cases demonstrate how Agile processes and PA practices support the continuous development of final systems. They involve releasing reduced operational versions periodically, each with incremental functionality. This approach provides the different teams with a framework to prepare for cruise checkout and science activities, serving as real training for future science operations upon arrival at the planet.

Traditionally, SOC readiness has primarily focused on the science phase, where scientific observations are conducted. However, overlooking the cruise phase can have significant implications for mission success. During this phase, the software utilized is often in its early developmental stage, featuring limited functionality and potential malfunctions.

Recognizing the varying maturity of software during the cruise phase enhances mission planning and risk management. Early identification of limitations allows the SOC to allocate resources and enhance functionality in preparation for the science phase, ultimately contributing to the overall success of the mission.